

RIVERS AND FLOODS

By H. C. FRANKENFIELD

Atlantic drainage.—During the evening of December 7 and the morning of December 8 moderately heavy rains fell upon a substantial snow cover in New England and interior New York. As the soil was saturated, the runoff was greater than usual, and either bankful or flood stages resulted in most streams. Over the Winooski Valley of Vermont the river between banks was full and there were fears of a repetition of the November flood. Reassuring advices were issued and the rise passed off without serious consequences. A temporary bridge at Waterbury, Vt., was carried away, and in the towns along the river there was considerable flooding of roads, basements, and cellars.

The Connecticut River was in moderate flood above Bellows Falls, Vt., on December 8, and at Hartford, Conn., two days later. Advisory warnings were issued, and the resulting damage was small. At Hartford, Conn., there was much alarm felt, but nothing occurred beyond the flooding of the meadow districts and a few houses and roads.

Warnings were issued on December 8 for the lower Hudson River, and on the following day the river reached the forecast stage of 13 feet at Albany, and a stage of 17.3 feet, 2.3 feet above the flood stage, at Troy, N. Y. No material damage resulted, and savings reported amounted to between \$600 and \$800. Heavy rains on December 2, 3, and 4 over the Carolinas were followed by moderate floods in nearly all rivers. No losses were reported in North Carolina. The rises were very helpful to logging interests, and savings through warnings were reported at \$10,000. Additional heavy rains from December 14 to 16 caused secondary rises over the Santee River system of South Carolina, for which warnings were also issued. Some losses in livestock, probably amounting to \$1,000, were reported in the swamps about the confluences of the Wateree, Congaree, and Santee Rivers, but other livestock to the value of \$10,000 were driven to higher ground upon receipt of the warnings.

East Gulf drainage.—The rains from December 14 to 16 were followed by moderate floods in the Tombigbee system of Alabama and locally over the middle reaches of the Pearl River of Mississippi, and warnings were issued promptly. The Black Warrior and Tombigbee floods were somewhat earlier than usual, and losses were comparatively large for that section, amounting to about \$79,400, of which \$10,000 was in matured crops. Reports received indicate that property to the value of \$91,500 was saved through the warnings. In some localities the flood was of great value to logging interests, as a great quantity of logs was floated out from swamp lands.

The Pearl River did not quite reach the flood stage of 20 feet at Jackson, Miss., during the first rise, but with the aid of additional heavy rains on December 28 and 29 the river passed the flood stage on the latter date and continued to rise slowly to a crest of 24.2 feet on January 7, 1928. The river was above the flood stage at Jackson from December 29, 1927, to January 12, 1928. During this rise the West Pearl River at Pearl River, La., also reached the flood stage. No losses resulted from these floods other than a little due to temporary suspension of business in some localities.

Great Lakes drainage.—Rains of 2 to 4 inches during the last three or four days of November and on December 1 resulted in general floods in the Maumee and

Sandusky Rivers of Ohio, for which the usual warnings were issued. The Maumee River at Fort Wayne, Ind., reached a crest of 18.2 feet, 3.2 feet above the flood stage, on December 3, while the tributary St. Joseph River exceeded the flood stage of 10 feet by 4 feet at Montpelier, Ohio, on December 1. Additional heavy rains on December 12 and 13 caused a second flood of about the same proportions from December 14 to 18. Damage was inconsequential. There were also two flood crests in the Sandusky River of Ohio coincident with the Maumee crests, and here again there was little or no damage.

An ice jam at the new Fulton Street bridge in Grand Rapids, Mich., caused a 5-foot rise in the Grand River from December 18 to 19. The highest stage was 11.7 feet, or 0.7 foot above the flood stage. During this rise the gauge at the city filtration plant, about 1¼ miles upstream, showed a steady fall in the river.

At Portland, Mich., there was a local ice jam in the Grand River on December 12, although the river did not reach the flood stage. Neither at Portland nor Grand Rapids was there any damage of consequence.

Ohio Valley.—Frequent and sometimes moderately heavy rains over the Allegheny, Monongahela, and upper Ohio River basins during the last half of November saturated the soil and increased the stream flow to such an extent that the main rivers were nearly bankful by the end of the month. On the last day of the month nearly 2 inches of rain fell over the upper Allegheny Basin and the river quickly rose to flood stage. To the southward the rains were light. The crest of the rise reached Pittsburgh, Pa., on December 2 with a stage of 23 feet, 2 feet below the flood stage. The crest passed Shawneetown, Ill., on December 11 but was lost below that point in the continued rise caused by later rains.

The total loss due to this flood was about \$2,000.

During early December there was sufficient rain to maintain a rather heavy flow in the rivers of the Ohio system, and from December 8 to 20 there were only two or three days without rain, with the heaviest fall from December 13 to 16, and on December 14 an up-river flood set in, except in the Monongahela River, that carried through to the mouth of the Ohio River, although only in moderate form below the mouth of the Great Kanawha River.

Warnings for the Pittsburgh district were issued on December 13 and again on the morning of December 14, when a stage between 29 and 30 feet, or 5 feet above the flood stage, was forecast for Pittsburgh by 6 p. m. of that day, later changed to 30 to 31 feet by 8 p. m. A crest of 30.4 feet was reached at 9 p. m. The forecast of 42 to 43 feet at Wheeling, W. Va., on December 15 was later changed to not to exceed 42 feet, and the crest was 40.8 feet, or 4.8 feet above the flood stage, at 3 p. m., December 15.

Losses in the Pittsburgh district due to the flood were estimated at \$25,000, while the value of property saved by the warnings was reported to have been \$100,000. Many expressions of commendation regarding the warning service were received. The police department and the newspapers of Pittsburgh assisted greatly in distributing information of the rapid approach of the flood.

From Wheeling, W. Va., to the mouth of the Kanawha River the crests averaged from 4 to 5 feet above the flood stages. Excellent warnings were issued from the district center at Parkersburg, W. Va., and there was ample time for all precautionary measures. There were the

usual annoyance and extra labor in the cities, but practically no loss; but farmers lost hay, corn, and corn fodder to the value of perhaps \$50,000.

In the Cincinnati, Ohio, and Louisville, Ky., districts rivers only approximated the flood stages. The necessary warnings were issued and there was no damage worthy of special mention.

In the Evansville, Ind., and Cairo, Ill., districts the crest stages were from 2½ to 5 feet above the flood stages, which, however, were absent above the mouth of the Cumberland River. The only losses reported were \$5,000 in crops in the Shawneetown, Ill., section, with savings of about \$10,000 in stock and corn. The crest of the flood passed Cairo, Ill., on December 23 and 24 with a stage of 38.2 feet, or 6.8 feet below the flood stage.

The Ohio and Indiana tributaries of the Ohio River were also in flood and contributed quite materially to the main flood. Stages several feet above flood stage were reached in the Muskingum, Tuscarawas, Walhonding, and Scioto Rivers, and warnings were issued when possible. Losses as reported aggregated \$36,500, of which \$10,000 was in crops.

The floods in the Wabash system were of the same general character. While they were very well forecast, the losses were very heavy on account of the large quantities of corn that had not dried sufficiently for husking, the reported value of which was \$201,200. Other losses reported amounted to \$37,500, making a total of \$238,700. In the city of Terre Haute, Ind., some streets and houses were flooded by the rise during the first week of the month.

Mississippi drainage.—Under the influence of occasional rains in the latter days of November and the first 10 days of December, a flood that began in the Illinois River during the last two days of November continued throughout the month of December, and the crest stages were several feet above the flood stages. There were three rises in the upper river, merging into a single rise in the alluvial river. Timely warnings were issued and the only trouble caused was the retardation of flood protection work below Peru, Ill.

The heavy rains of November 30 and December 1 caused moderate and harmless floods in the Bourbeuse and Meramec Rivers of Missouri, and there was a second flood of a similar nature on December 16. The usual warnings were issued.

In the Black River of Missouri and Arkansas there was a greater flood during the mid-month period, and warnings began on December 13, the first day of heavy rains. The resulting damage was largely to lumber in the vicinity of Poplar Bluff, Mo.

The rains from December 12 to 14 were followed by a moderate flood in the White River of Arkansas. Over the upper portion of the river the crest stages were far above the flood stages, while below they were much more moderate, and at Clarendon, Ark., the flood stage was not reached. Moderate flood stages were also recorded in the Arkansas River from Dardanelle to Morrilton, and at Yancopin, Ark. Apparently there was very little loss or damage.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ATLANTIC DRAINAGE					
Connecticut:	Feet			Feet	1927
White River Junction, Vt.....	15	8	9	16.7	Dec. 8.
Hartford, Conn.....	16	10	11	17.6	Dec. 10.
Hudson: Albany, N. Y.....	12	9	9	13.0	Dec. 9.
Unadilla: New Berlin, N. Y.....	8			8.2	Dec. 8.
Roanoke: Weldon, N. C.....	30	5	10	37.6	Dec. 6.
Tar:					
Tarboro, N. C.....	18	7	10	19.8	Dec. 9.
Greenville, N. C.....	14	7	12	15.9	Dec. 10.
Neuse:					
Neuse, N. C.....	15	5	7	15.7	Dec. 6.
		17	17	15.1	Dec. 17.
Smithfield, N. C.....	14	5	9	18.0	Dec. 6.
		18	19	14.8	Dec. 18.
Cape Fear:					
Fayetteville, N. C.....	35	5	7	39.3	Dec. 6.
Elizabethtown, N. C.....	22	5	10	30.2	Dec. 7.
		18	20	24.9	Dec. 19.
Peedee:					
Cheraw, S. C.....	27	17	18	28.0	Dec. 18.
Mars Bluff, S. C.....	17	7	12	13.9	Dec. 9-10.
		19	22	17.8	Dec. 22.
Santee: Ferguson, S. C.....	12	8	28	13.7	Dec. 10, 23.
Congaree: Columbia, S. C.....	15	3	4	15.6	Dec. 4.
Broad: Blairs, S. C.....	15	4	5	16.9	Dec. 5.
		16	17	15.0	Dec. 16-17.
Saluda:					
Pelzer, S. C.....	7	16	17	7.8	Dec. 16.
Chappells, S. C.....	14	4	5	15.1	Dec. 5.
		16	18	15.9	Dec. 17.
EAST GULF DRAINAGE					
Tombigbee: Lock No. 4, Demopolis, Ala.....	39	19	24	44.0	Dec. 21.
Black Warrior: Lock No. 10, Tuscaloosa, Ala.....	46	10	18	54.5	Dec. 17.
Pearl: Jackson, Miss.....	20	29	Jan. 12	24.2	1928 Jan. 7.
GREAT LAKES DRAINAGE					
Maumee: Fort Wayne, Ind.....	15	1	5	18.2	1927 Dec. 3.
		14	18	17.8	Dec. 15.
St. Joseph: Montpelier, Ohio.....	10	(?)		14.0	Dec. 1.
				13.2	Dec. 15.
Sandusky:					
Upper Sandusky, Ohio.....	13	1	2	15.5	Dec. 2.
		14	14	16.5	Dec. 14.
Tiffin, Ohio.....	7	16	16	7.2	Dec. 16.
Grand: Grand Rapids, Mich.....	11	19	20	11.7	Dec. 19.
MISSISSIPPI DRAINAGE					
Allegheny:					
Warren, Pa.....	12	1	2	13.2	Dec. 1.
Franklin, Pa.....	15	1	2	17.2	Do.
Parkers Landing, Pa.....	18	1	1	18.2	Do.
Lock No. 5, Freeport, Pa.....	24	1	3	27.7	Dec. 2.
		14	17	30.7	Dec. 14.
Lock No. 4, Natrona, Pa.....	24	2	2	26.4	Dec. 2.
		14	15	28.3	Dec. 14.
Lock No. 3, Springdale, Pa.....	27	14	14	28.5	Do.
Monongahela:					
Lock No. 7, Greensboro, Pa.....	30	14	14	30.4	Do.
Lock No. 4, Pa.....	31	14	14	31.4	Do.
Ohio:					
Pittsburgh, Pa.....	25	14	15	30.4	Do.
Lock No. 2, Coraopolis, Pa.....	26	14	15	27.8	Do.
Beaver Dam, Pa.....	30	14	17	37.9	Dec. 15.
Dam No. 12, near Wheeling, W. Va.....	36	15	16	37.7	Do.
St. Marys, W. Va.....	38	16	17	38.7	Dec. 16.
Marietta, Ohio.....	33	15	19	40.7	Dec. 17.
Parkersburg, W. Va.....	36	16	19	41.9	Do.
Dam No. 19, Tallman, W. Va.....	39	16	19	42.7	Do.
Dam No. 22, Ravenswood, W. Va.....	42	16	19	46.1	Do.
Point Pleasant, W. Va.....	40	17	20	45.3	Dec. 18.
Dam No. 25, near Point Pleasant, W. Va.....	40	16	20	46.9	Dec. 19.
Dam No. 29, Normal, Ky.....	50	19	20	51.0	Do.
Portsmouth, Ohio.....	50	19	20	51.0	Do.
Dam No. 33, Maysville, Ky.....	48	20	20	48.2	Dec. 20.
Dam No. 44, Leavenworth, Ind.....	48	21	23	48.4	Dec. 22.
Dam No. 45, Addison, Ky.....	40	20	24	42.5	Dec. 22-23.
Cloverport, Ky.....	40	21	23	40.6	Do.
Evansville, Ind.....	35	19	27	38.7	Dec. 24.
Dam No. 48, Cypress, Ind.....	35	20	26	37.6	Do.
Mount Vernon, Ind.....	35	20	27	38.5	Dec. 25.
Shawneetown, Ill.....	35	17	28	40.1	Do.

¹ Estimated.

² Continued from last month.

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI DRAINAGE—continued					
Beaver: Beaver Falls, Pa.-----	11	14	17	13.1	1927 Dec. 14.
Shenango: Sharon, Pa.-----	9	1	3	12.3	Dec. 2.
		14	17	10.8	Dec. 14.
Muskingum:					
McConnellsville, Ohio.-----	22	15	19	24.3	Dec. 17.
Beverly, Ohio.-----	25	16	16	25.1	Dec. 16.
Marietta, Ohio.-----	28	15	19	34.5	Dec. 17.
Tuscarawas:					
Gnadenhutten, Ohio.-----	9	(?)	5	14.2	Dec. 2-3.
		13	20	15.4	Dec. 17.
Coshocton, Ohio.-----	8	1	4	14.7	Dec. 2.
		14	19	14.4	Dec. 16.
Walhonding: Walhonding, Ohio.-----	8		3	14.1	Dec. 1.
Scioto:					
Larue, Ohio.-----	11	1	2	14.1	Do.
		14	15	14.4	Dec. 14.
Prospect, Ohio.-----	10	1	3	12.9	Dec. 2.
		15	17	12.7	Dec. 15.
Bellpoint, Ohio.-----	9	1	1	9.7	Dec. 1.
Circleville, Ohio.-----	10	2	3	13.5	Dec. 3.
		14	17	14.0	Dec. 15.
Chillicothe, Ohio.-----	16	3	4	17.6	Dec. 3.
		15	17	19.1	Dec. 16.
Olentangy: Delaware, Ohio.-----	9		1	12.9	Dec. 1.
Little Miami: Kings Mills, Ohio.-----	17	14	14	20.7	Dec. 14.
Wabash:					
Lafayette, Ind.-----	11	(?)	10	21.9	Dec. 2.
		14	18	18.8	Dec. 16.
Covington, Ind.-----	16	(?)	20	25.0	Dec. 4.
Terre Haute, Ind.-----	16	2	21	21.2	Dec. 5.
Vincennes, Ind.-----	14	6	25	19.1	Dec. 9.
Mount Carmel, Ill.-----	16	3	25	22.1	Dec. 9, 17.
Tippecanoe: Norway, Ind.-----	6	(?)	26	6.5	Dec. 1, 2, 7,
		29	29	6.1	14, 16, 29.
White: Decker, Ind.-----	18	5	10	19.3	Dec. 5-9.
		15	23	20.9	Dec. 21-22.
White, East Fork:					
Seymour, Ind.-----	10	1	3	12.5	Dec. 2.
		15	15	11.5	Dec. 15.
Williams, Ind.-----	10	18	18	10.5	Dec. 18.
Shoals, Ind.-----	20	6	6	20.4	Dec. 6.
		18	20	21.2	Dec. 19.
White, West Fork:					
Eliston, Ind.-----	19	3	4	19.7	Dec. 4.
		15	17	21.0	Dec. 17.
Edwardsport, Ind.-----	15	2	6	17.0	Dec. 5.
		15	20	17.5	Dec. 18-19.
Elk: Fayetteville, Tenn.-----	14	31	31	16.3	Dec. 31.
Illinois:					
Morris, Ill.-----	13	(?)	5	14.7	Dec. 1.
		8	17	15.4	Dec. 15-16.
Peru, Ill.-----	14	(?)	(?)	20.0	Dec. 18-19.
Henry, Ill.-----	10	(?)	(?)	14.4	Dec. 17-18.
Peoria, Ill.-----	18	2	(?)	20.9	Dec. 18-20.
Havana, Ill.-----	14	1	(?)	18.1	Dec. 19.
Beardstown, Ill.-----	14	2	(?)	19.3	Dec. 16-18.
Pearl, Ill.-----	12	4	(?)	15.8	Dec. 20.
Meramec:					
Pacific, Mo.-----	11	1	4	15.5	Dec. 3.
Valley Park, Mo.-----	14	1	4	16.8	Do.
		15	17	16.9	Dec. 16.
Bourbeuse: Union, Mo.-----	12	2	3	13.9	Dec. 3.
St. Francis: St. Francis, Ark.-----	17	17	28	26.1	Dec. 19.
Arkansas:					
Dardanelle, Ark.-----	20	14	14	23.8	Dec. 14.
Morrilton, Ark.-----	20	14	14	20.0	Do.
Yancopin, Ark.-----	29	17	17	29.1	Dec. 17.
Petit Jean: Danville, Ark.-----	20	15	17	22.7	Dec. 16.
White:					
Calico Rock, Ark.-----	18	14	17	39.6	Dec. 14.
Batesville, Ark.-----	23	14	18	37.6	Dec. 15.
Newport, Ark.-----	26	16	21	29.7	Dec. 18.
Georgetown, Ark.-----	22	19	29	25.4	Dec. 22.
DeValls Bluff, Ark.-----	24	22	29	25.7	Dec. 24.
Buffalo: Gilbert, Ark.-----	30	14	14	38.0	Dec. 14.
Black:					
Leeper, Mo.-----	11	14	14	15.5	Do.
Williamsville, Mo.-----	11	14	15	16.0	Do.
Poplar Bluff, Mo.-----	14	14	17	18.1	Dec. 15.
Corning, Ark.-----	11	15	28	15.1	Dec. 19.
		31	31	11.0	Dec. 31.
Black Rock, Ark.-----	14	14	(?)	25.3	Dec. 15.
WEST GULF DRAINAGE					
Trinity: Trinidad, Tex.-----	28	19	24	28.5	Dec. 21-22.
PACIFIC DRAINAGE					
Columbia: Vancouver, Wash.-----	15	(?)	2	16.3	Nov. 29.
Willamette:					
Harrisburg, Oreg.-----	7	(?)	4		Do.
Portland, Oreg.-----	15	(?)	3	17.5	Do.
Willamette, Coast Fork: Saginaw, Oreg.-----	5	13	15	5.3	Dec. 14-15.
		30	(?)	5.4	Dec. 31.

¹ Continued from last month.

² Continued at end of month.

MEAN LAKE LEVELS DURING DECEMBER, 1927

By UNITED STATES LAKE SURVEY

[Detroit, Mich., January 5, 1928]

The following data are reported in the Notice to Mariners of the above date:

Data	Lakes ¹			
	Superior	Michigan and Huron	Erie	Ontario
Mean level during December, 1927:				
Above mean sea level at New York—	Feet	Feet	Feet	Feet
Above or below—	602.39	578.82	571.51	245.65
Mean stage of November, 1927...	-0.15	-0.09	+0.40	+0.80
Mean stage of December, 1926...	+0.75	+0.57	+0.05	+0.23
Average stage for December, last 10 years...	+0.52	-0.56	-0.02	+0.45
Highest recorded December stage...	-0.74	-3.76	-2.02	-1.86
Lowest recorded December stage...	+2.14	+1.28	+1.12	+2.22
Average departure (since 1860) of the December level from the November level...	-0.27	-0.22	-0.08	-0.09

¹ Lake St. Clair's level: In December, 1927, 574.13 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS, DECEMBER, 1927

By J. B. KINCER

General summary.—The outstanding favorable feature of the weather during the first decade of December was the effective relief of the droughty conditions in the southeastern States. Generous to heavy rains there bountifully supplied the soil with needed moisture, which, together with the generally mild temperatures, brought a marked improvement to the agricultural situation. In the trans-Mississippi States cool weather brought frost nearly to the Gulf coast with more or less damage to tender vegetation. Early in the period farm work made good advance in the more eastern States and upper Ohio Valley, but toward its close frequent precipitation and severe wintry conditions over large areas of the country westward to the Rocky Mountains were unfavorable, with little farm work accomplished.

During the second decade frequent rains, followed by cold, windy, disagreeable weather in most sections east of the Mississippi River, made conditions generally unfavorable for outside operations and very little activity on farms was reported. Over the Central and Northern States to the westward the continued abnormally low temperatures and rather severe snowstorms in northern districts were also unfavorable for agricultural interests.

During the last decade in the more northern districts east of the Mississippi River generally ample sunshine, absence of appreciable precipitation, and the frozen ground enabled corn husking to make excellent advance, with much progress reported in other sections to the westward. The lack of adequate snow cover over Central States caused some apprehension during the cold weather. Much hog killing was done in southern areas. In a large part of the Northeast there was very little farm activity, but from the Great Lakes westward there was a revival of outdoor operations, attending the reaction to more favorable weather.

Small grains.—At the beginning of the month grain fields were mostly protected by a snow cover in the northeast as far south as the Potomac Valley, in the Lake region, and in most sections between that region and the Rocky Mountains; the latter part of the first